



Beneficial reuse of alluvial sediment for multiple benefits:

Pajaro River Example

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Environmental Services Branch Chief
EWN Program Practice Lead



U.S. ARMY
US Army Corps
of Engineers

October 6, 2025



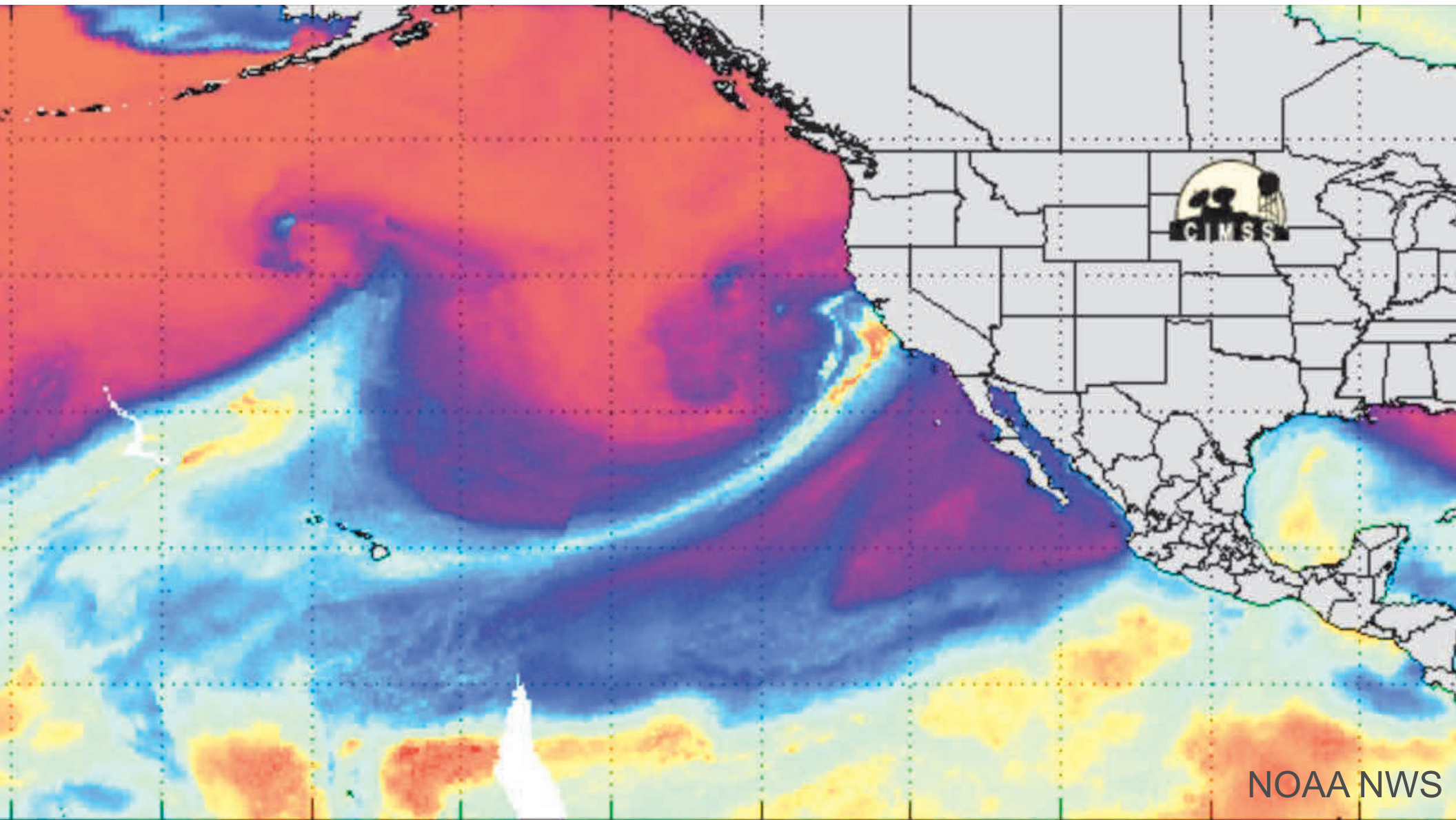
PAJARO RIVER FLOOD RISK MANAGEMENT PROJECT



- Existing levees provide 8-year level of flood risk reduction

- Community of Pajaro average median income is \$22,000/year

- Project sets back levees to give river room to activate floodplain, and alleviate flooding



NOAA NWS



Residents in Pajaro, Calif., were forced to evacuate in the middle of the night after an atmospheric river surge broke a Pajaro River levee and sent floodwaters flowing into the community on Saturday.

Josh Edelson/AFP via Getty Images

MARCH 2023

SF
Gate

10/5/2025

JAN 2023 BANK OVERFLOW

Corralitos Creek overtopped along both sides of the creek.

Flows to the north continued along Hollohan Blvd. flooding the community of Orchard Park and continued along College Rd.

Flows to the south crossed agricultural fields, overwhelmed a drainage basin (privately maintained), across E. Lake Ave. and south through the City of Watsonville generally along Bridge Street.

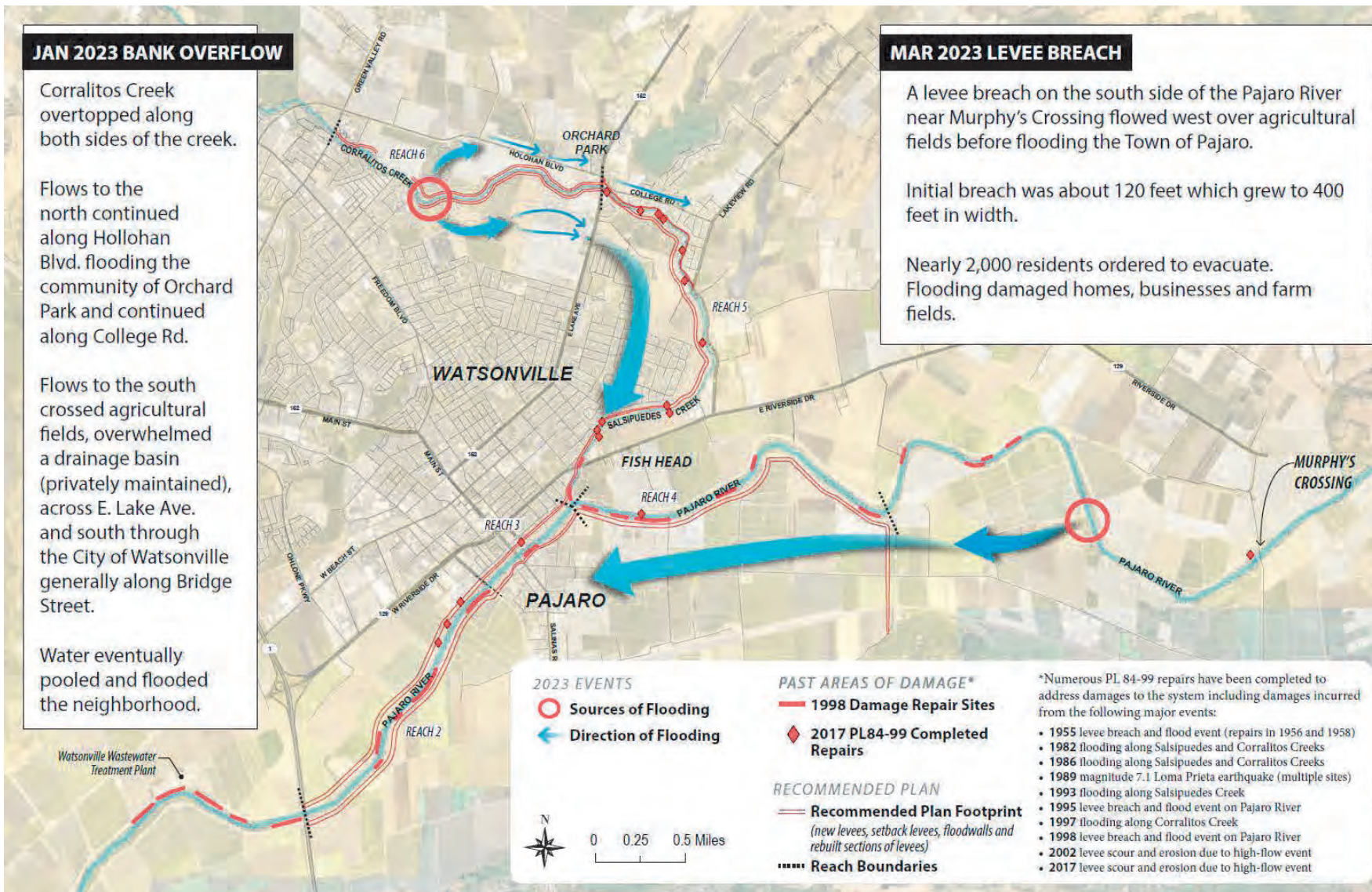
Water eventually pooled and flooded the neighborhood.

MAR 2023 LEVEE BREACH

A levee breach on the south side of the Pajaro River near Murphy's Crossing flowed west over agricultural fields before flooding the Town of Pajaro.

Initial breach was about 120 feet which grew to 400 feet in width.

Nearly 2,000 residents ordered to evacuate. Flooding damaged homes, businesses and farm fields.

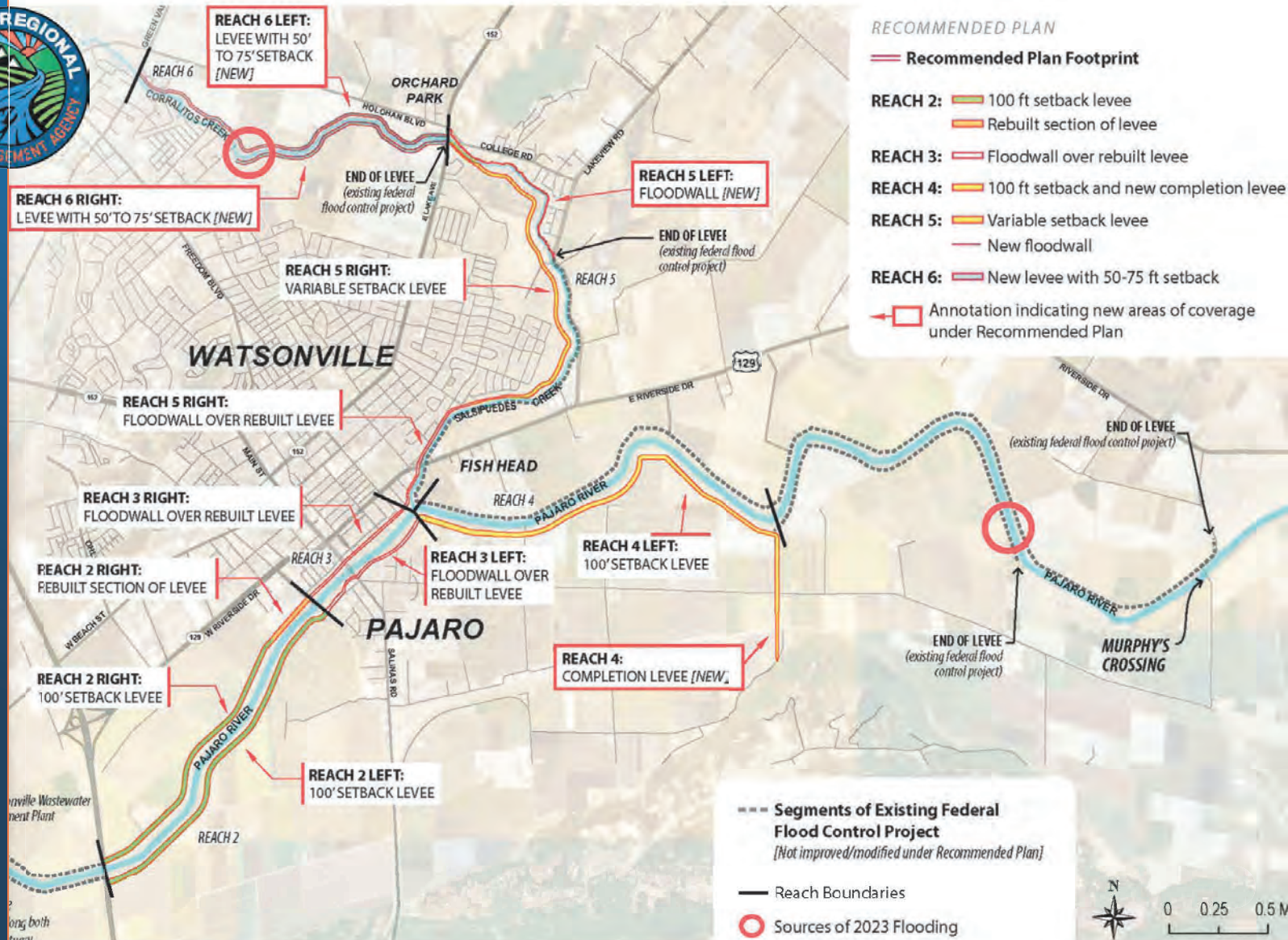




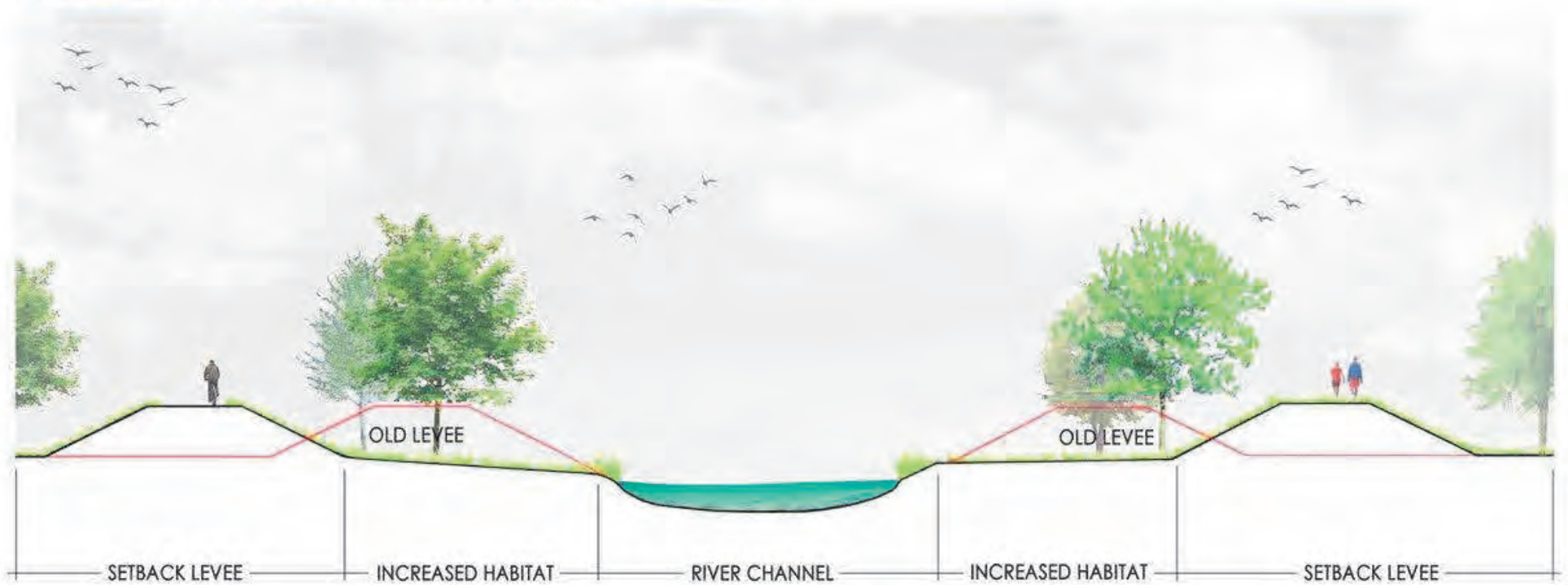
Pajaro River Flood Risk Mgmt. Project Update



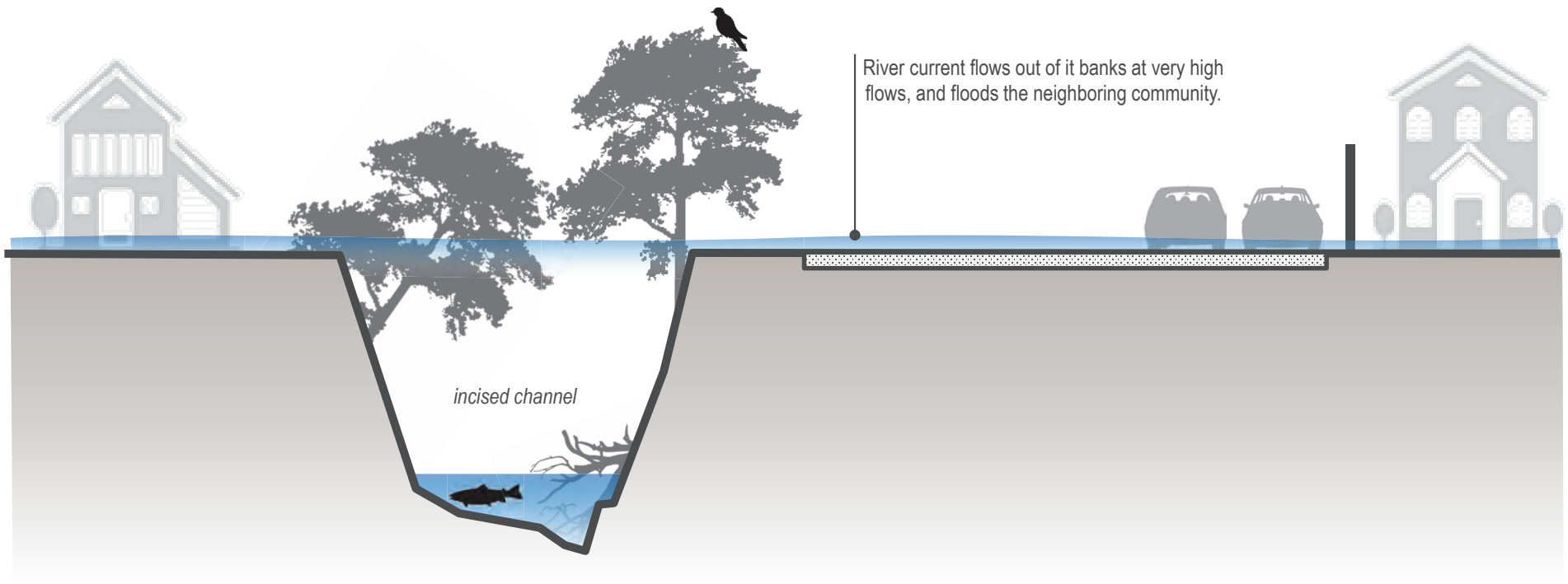
- Project will be built in phases, reach by reach.
- Construction is scheduled to start on Reach 6 in late Fall 2025.



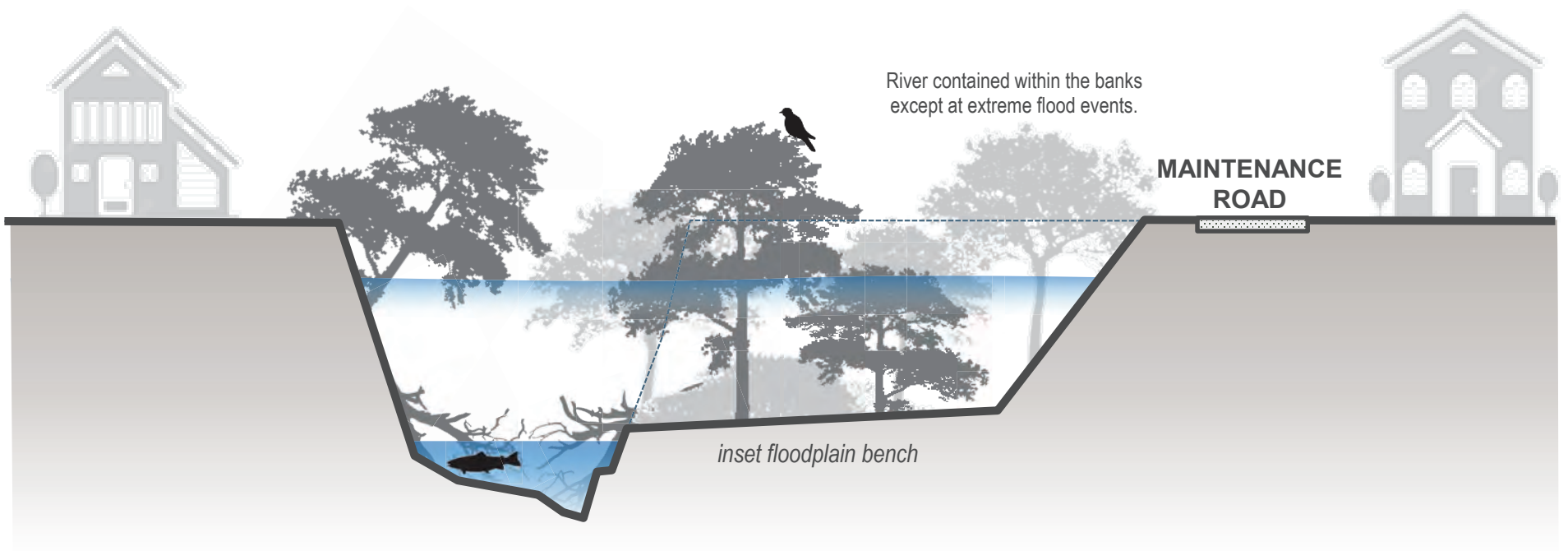
LEVEE SETBACK CROSS SECTION (CONCEPT DML1)



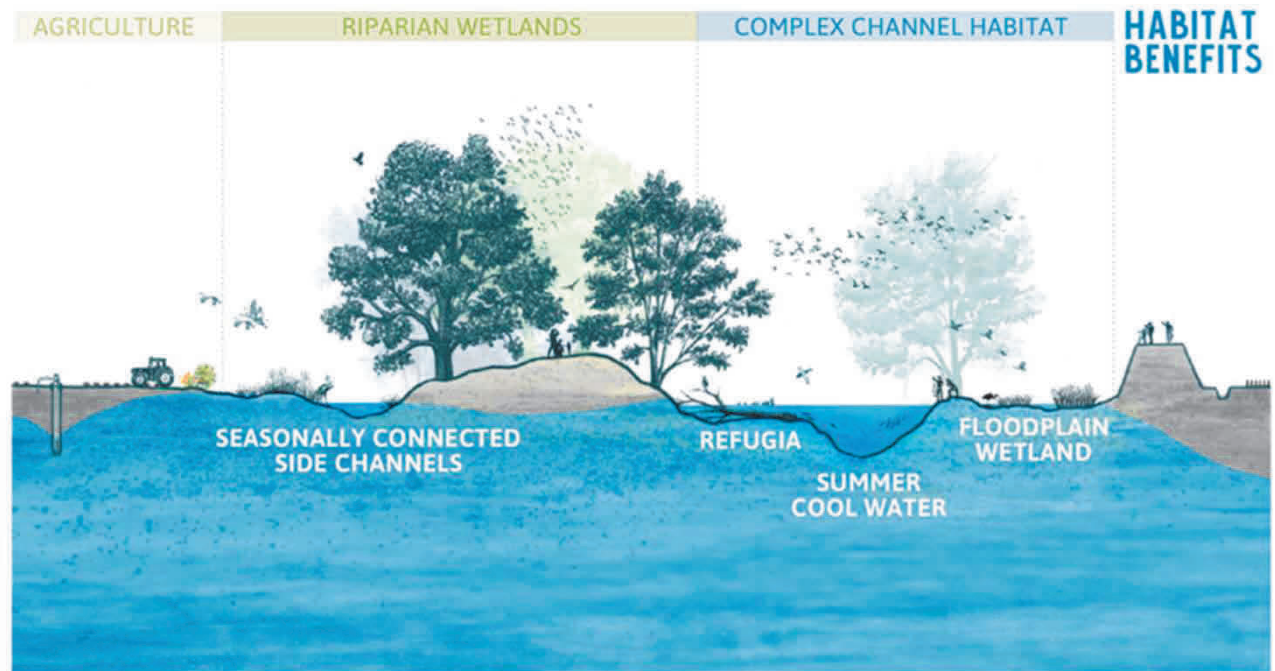
CURRENT CONDITIONS
(Conceptual)



WITH PROJECT (Conceptual)



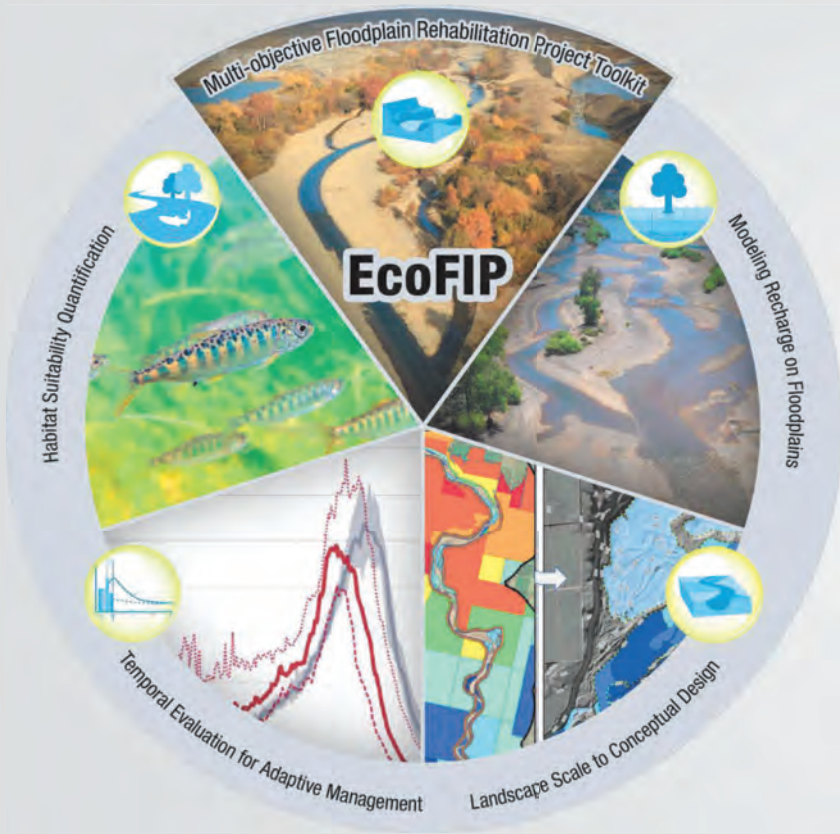
Benefits of Floodplain Features



HABITAT BENEFITS

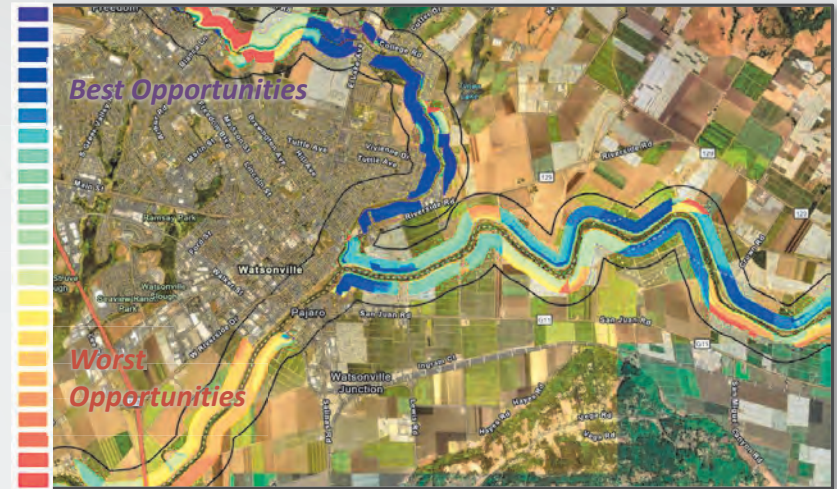
- | | | | | |
|-----------------------|----------------------------|---|----------------------------------|------------------------------|
| HUMAN BENEFITS | ↑ RAISED groundwater level | 🌡️ CLIMATE MITIGATION with carbon storage | 🎣 RECREATIONAL fishing + hunting | 🚰 MORE RELIABLE water supply |
| 🏠 SAFER FLOODS | 🍷 POLLINATION of crops | 💰 ECONOMIC DIVERSITY with eco-tourism | ⚙️ REDUCED regulation | 🕒 IMPROVED water quality |

Multiple Benefit Floodplain Restoration Pilot Studies

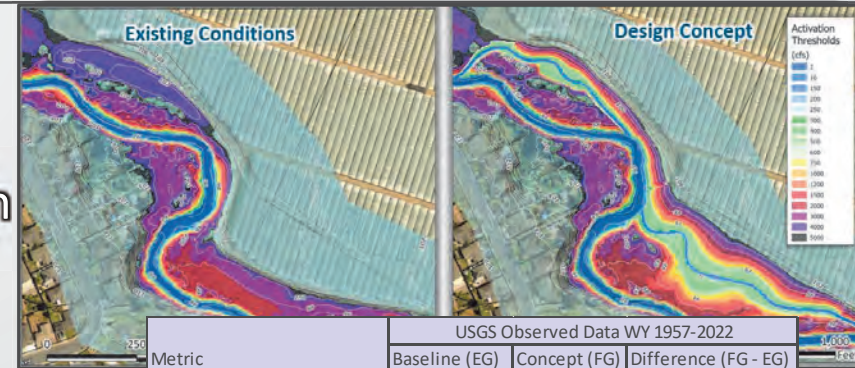


<https://storymaps.arcgis.com/stories/f899bf3c36a2403d9e0bd3c70dc2dfc5>

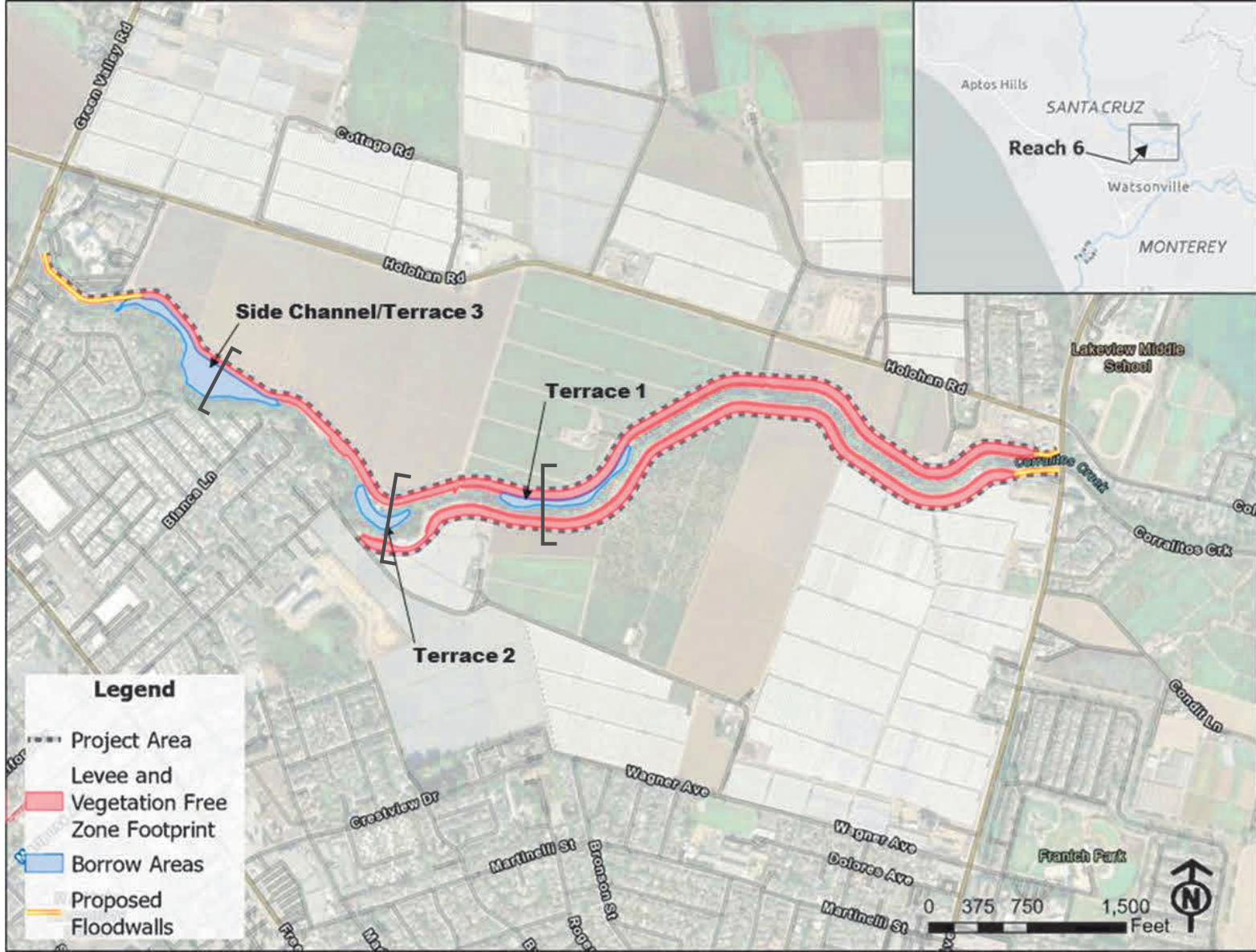
Identification,
Analysis, and
Prioritization



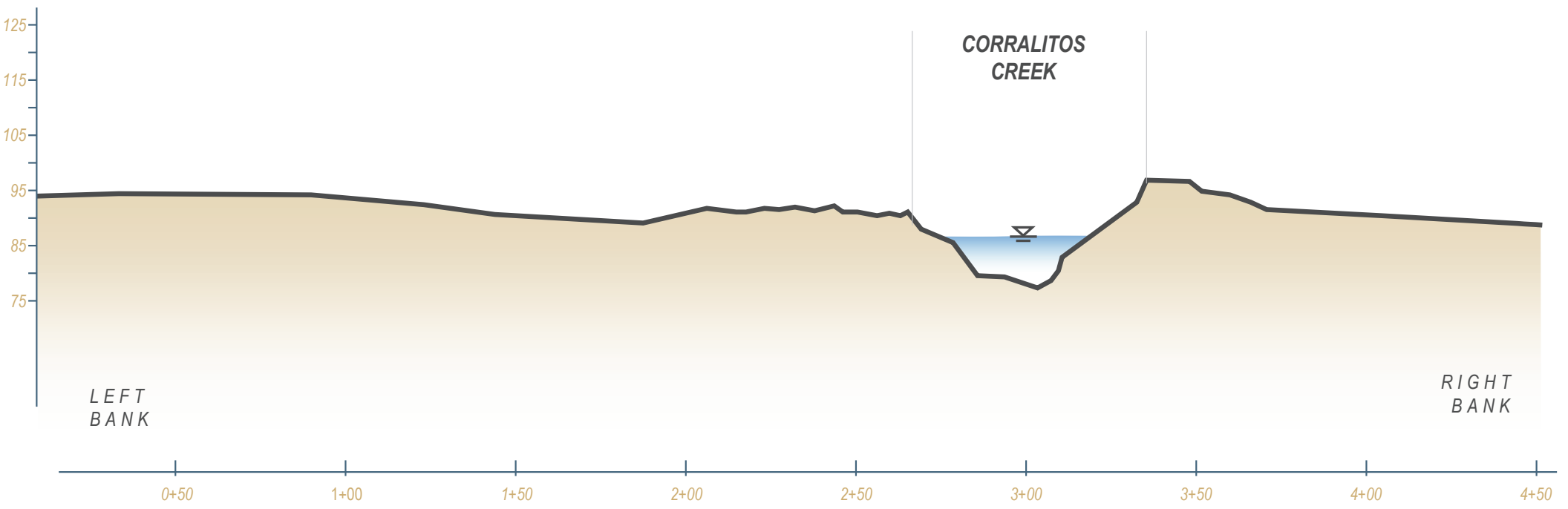
Ideas ->
Implementation



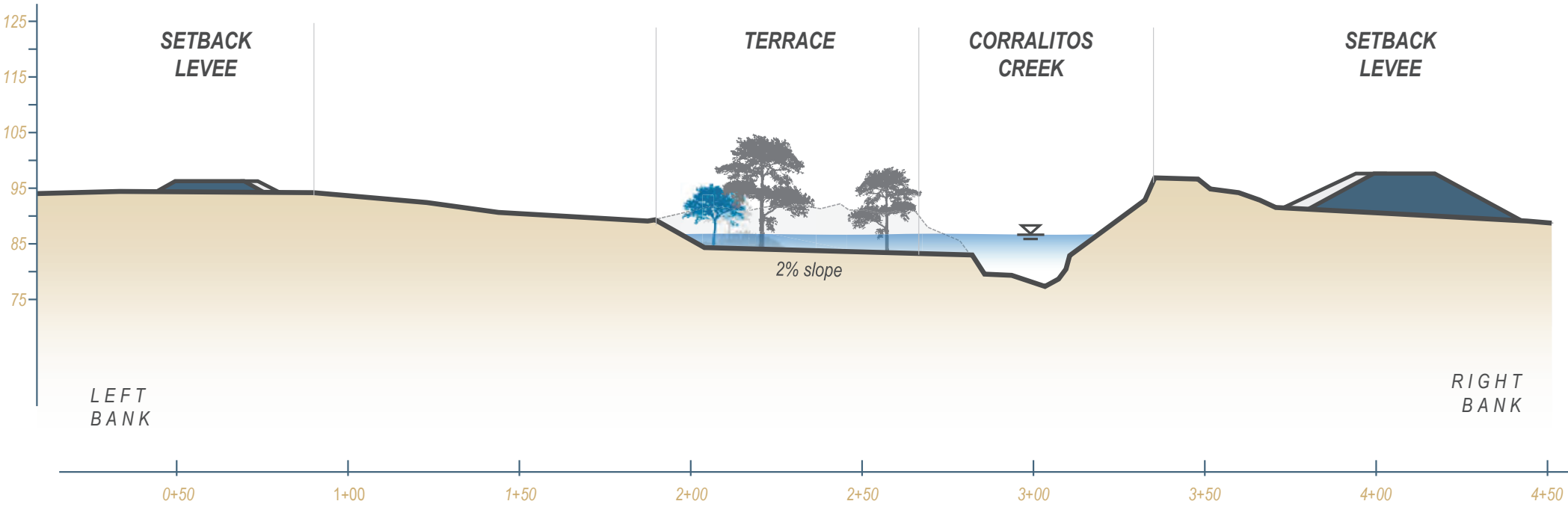
Metric	USGS Observed Data WY 1957-2022		
	Baseline (EG)	Concept (FG)	Difference (FG - EG)
Inundation (Acre-days / WY)	1409	1416	7
Habitat (Acre-days / WY)	397	399	2
Recharge (Acre-feet / WY)	589	617	28



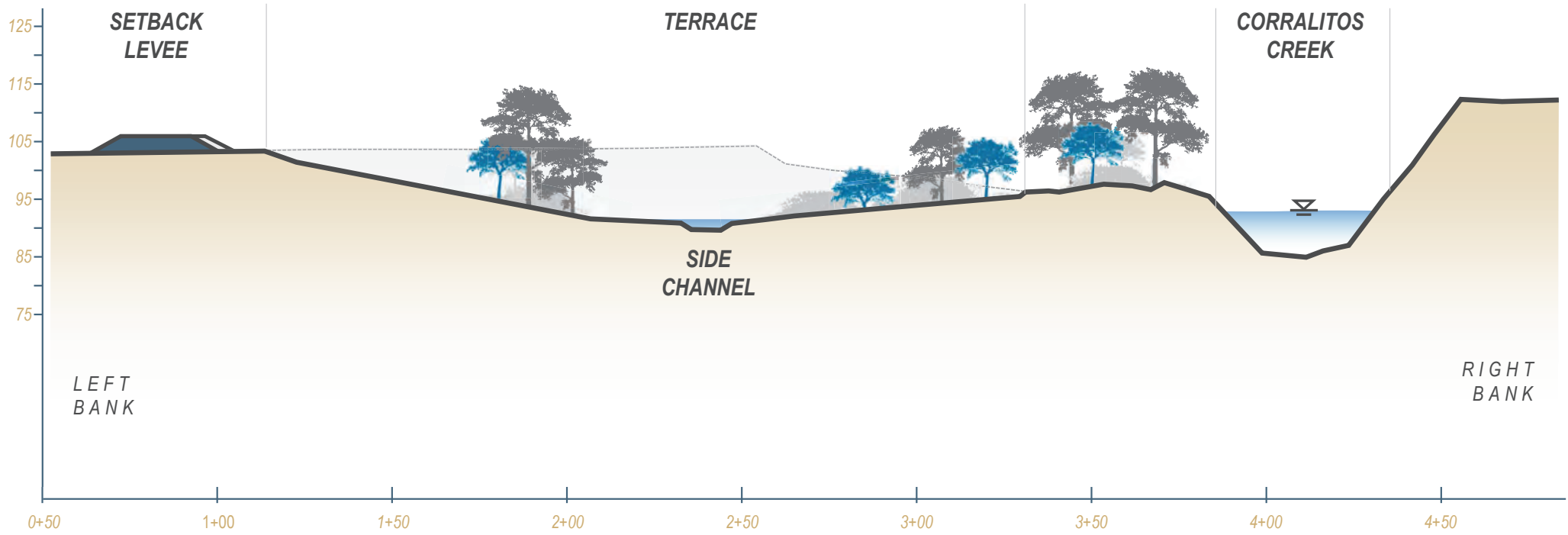
CURRENT CONDITIONS-Reach 6



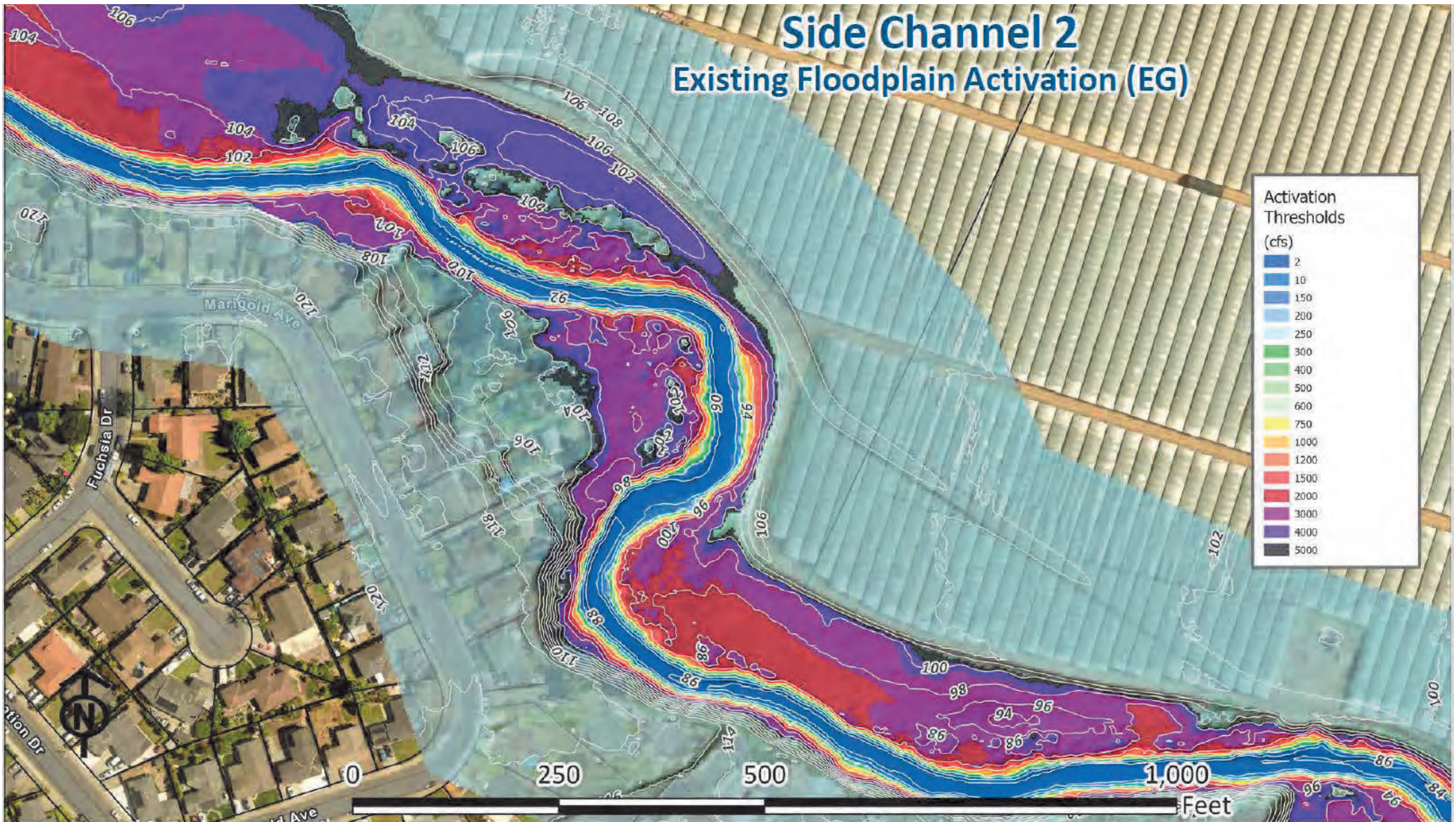
WITH-PROJECT CONDITIONS-Terrace feature



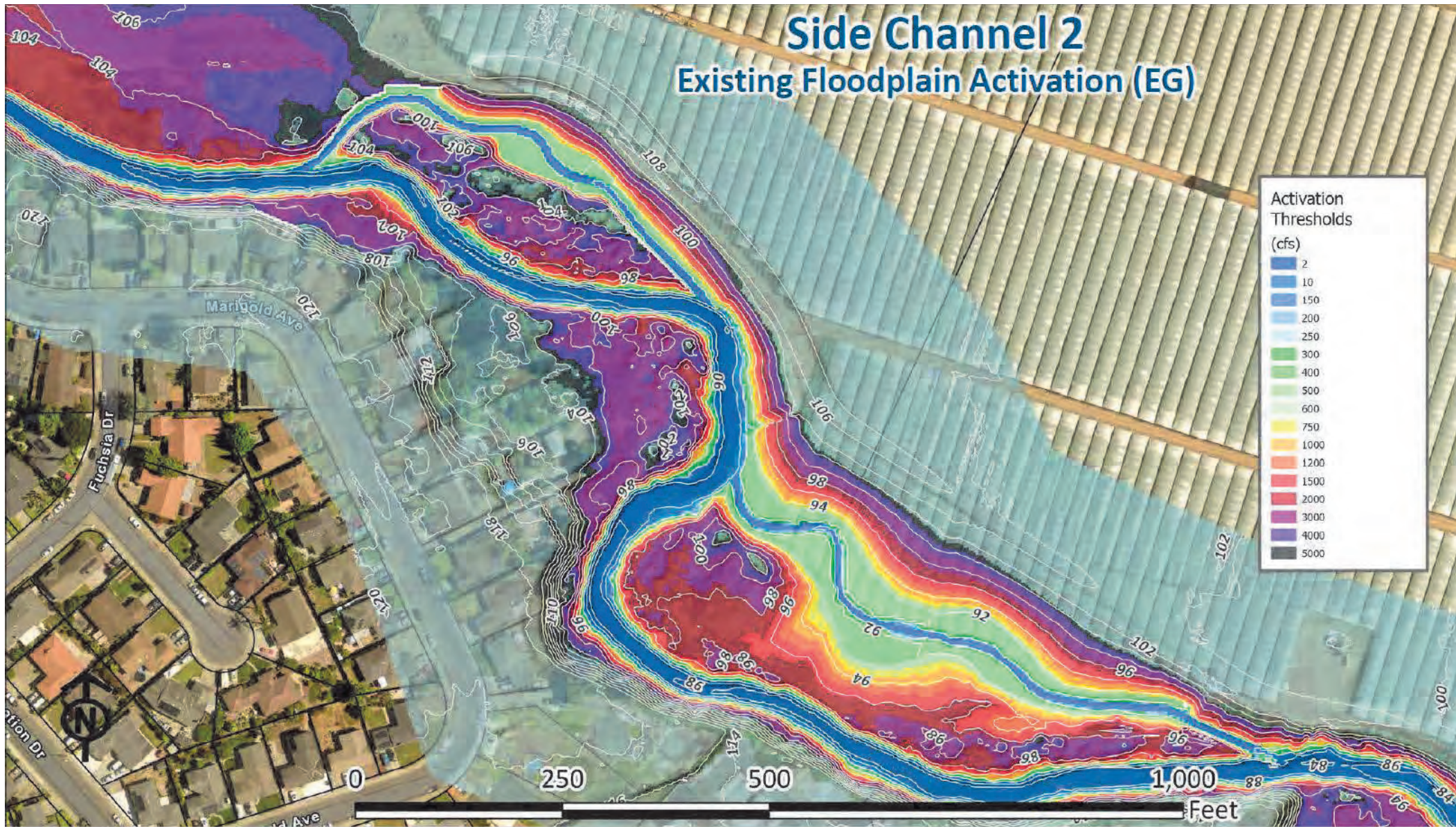
WITH-PROJECT CONDITIONS-Side Channel Feature



Side Channel 2 Existing Floodplain Activation (EG)



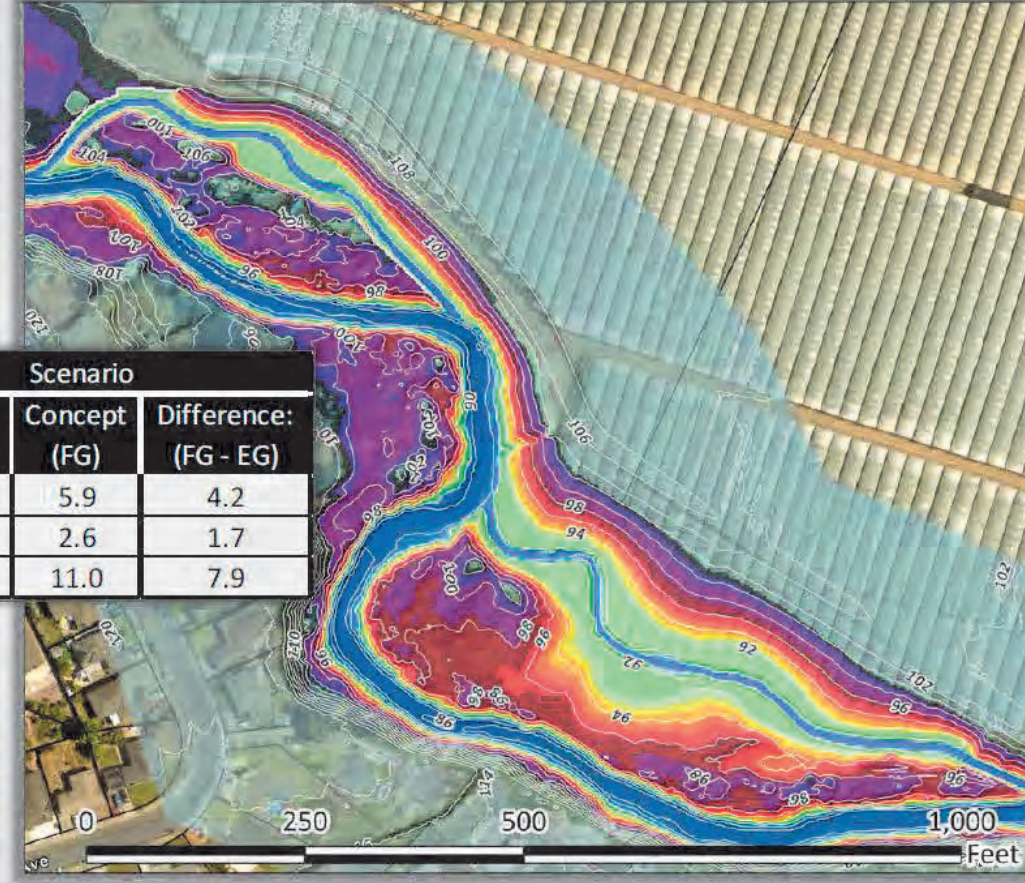
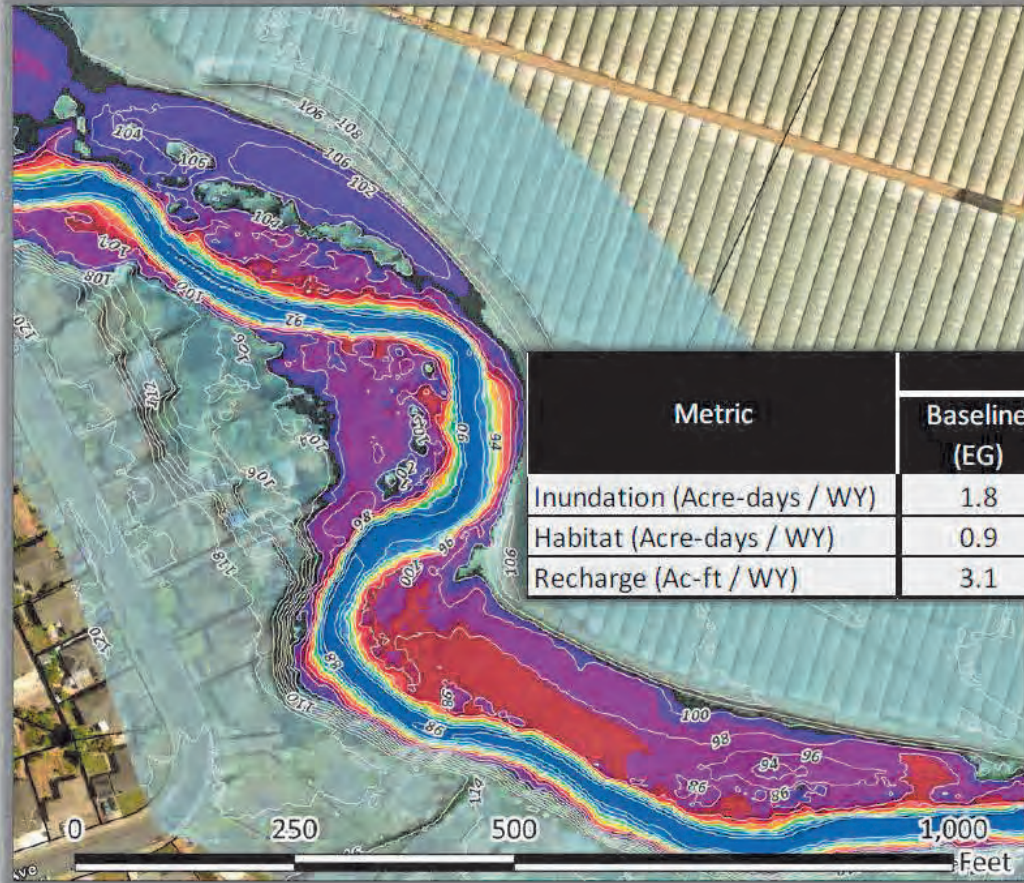
Side Channel 2 Existing Floodplain Activation (EG)



(EG)

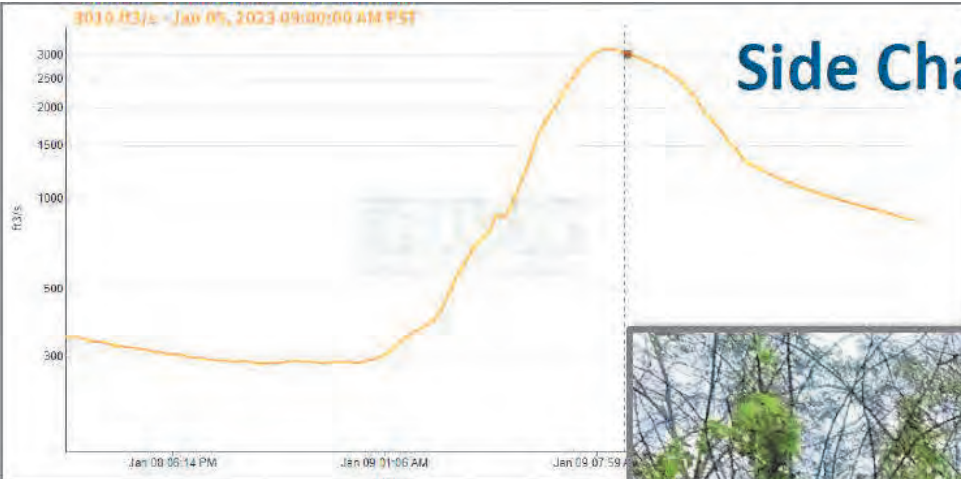
Side Channel 2

(FG)



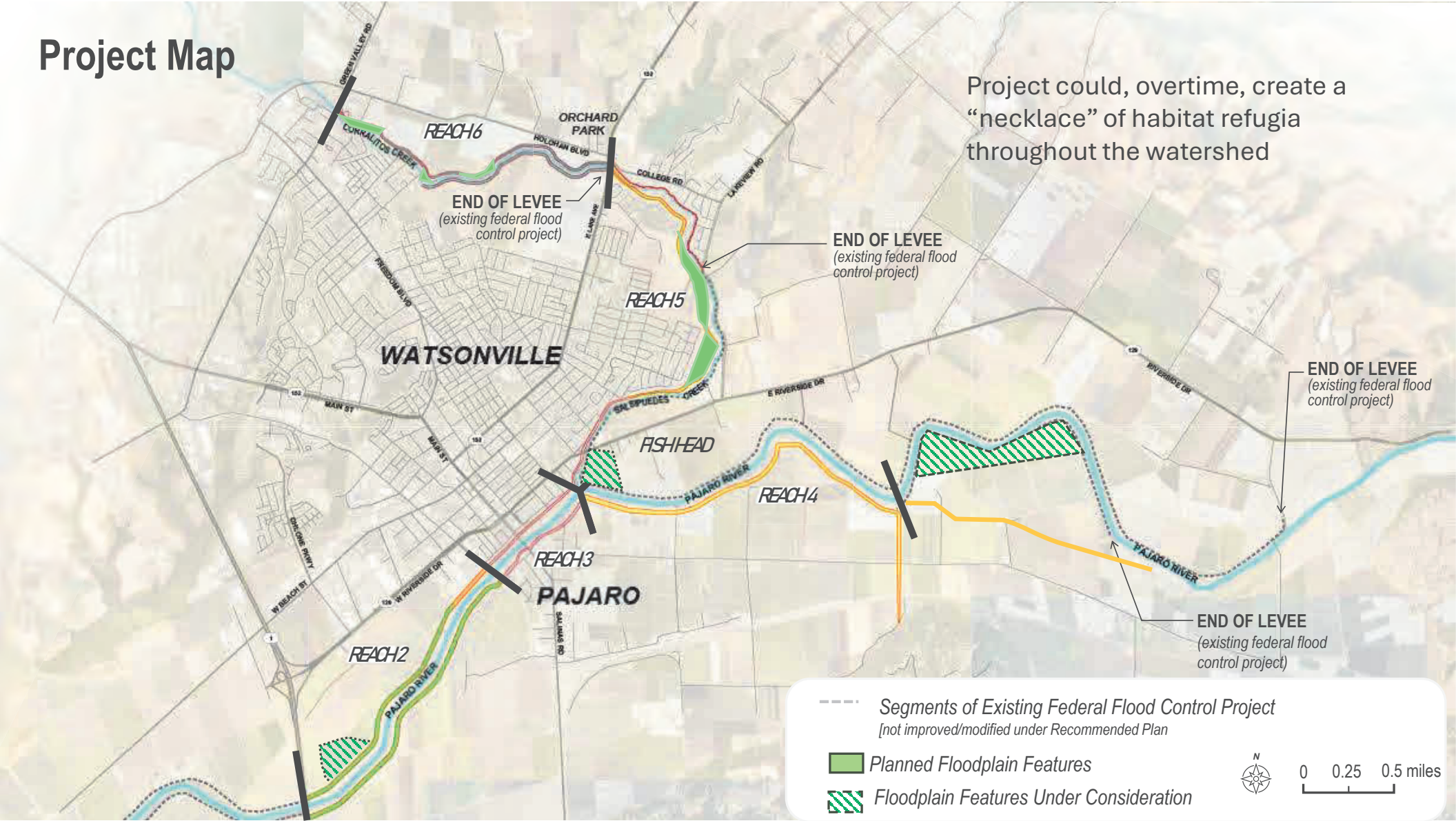
Metric	Scenario		
	Baseline (EG)	Concept (FG)	Difference: (FG - EG)
Inundation (Acre-days / WY)	1.8	5.9	4.2
Habitat (Acre-days / WY)	0.9	2.6	1.7
Recharge (Ac-ft / WY)	3.1	11.0	7.9

Side Channel 2 - Upstream



Project Map

Project could, overtime, create a “necklace” of habitat refugia throughout the watershed



--- Segments of Existing Federal Flood Control Project
[not improved/modified under Recommended Plan]

■ Planned Floodplain Features

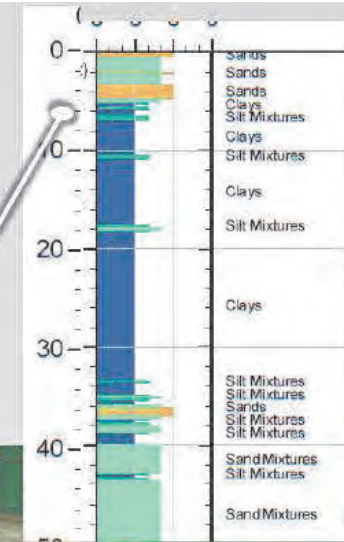
▨ Floodplain Features Under Consideration



0 0.25 0.5 miles

LEVEE FILL CRITERIA SCREENING

We expect to find finer grained materials (more suitable levee material) beneath 5 ft at the Bronte Ave site. This is also shown in the t-TEM data where the blues & greens in the resistivity suggest fines. Additional geotechnical investigations will be required to confirm material properties as well as the depth to the shallow groundwater table.



CPT 17



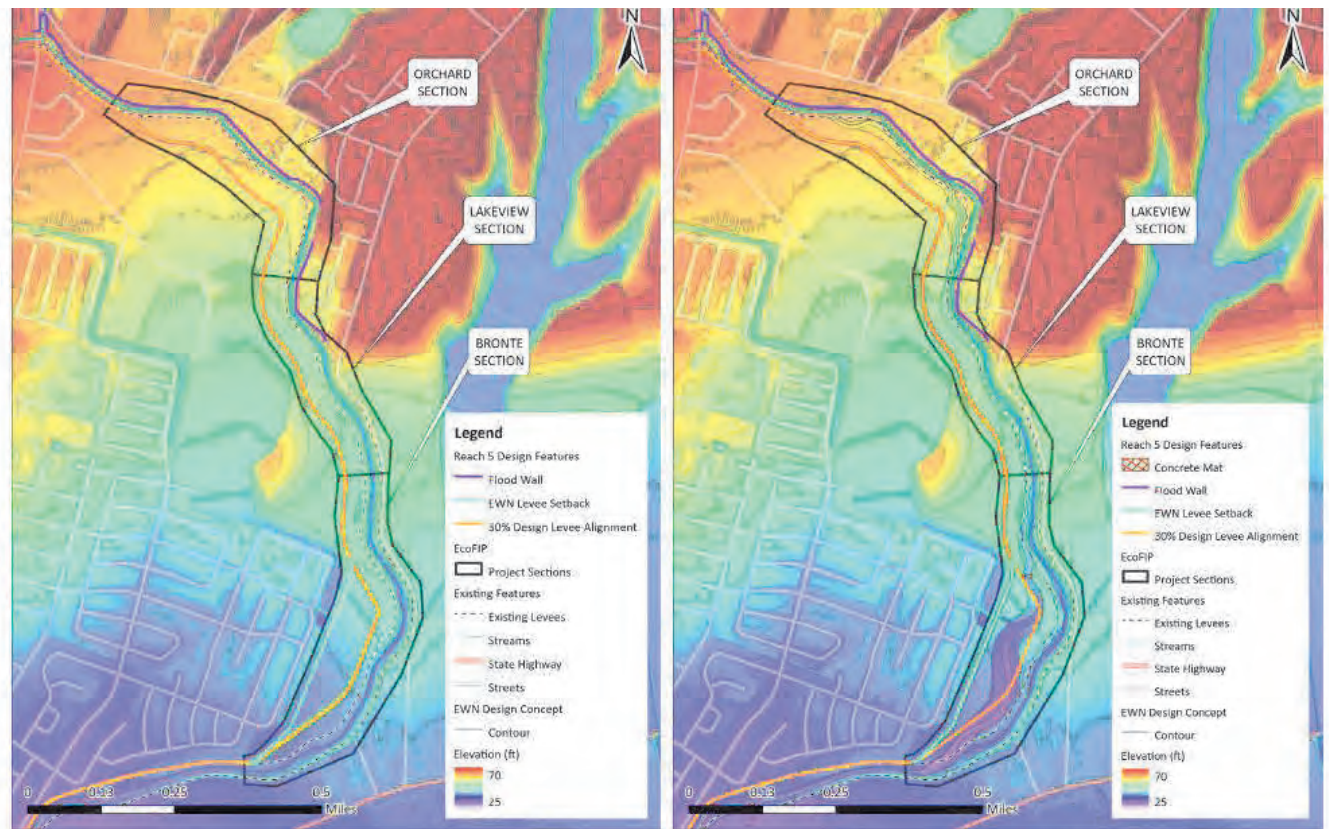
ITERATE AND EVALUATE: 30% DESIGN COMPARED TO EWN DESIGN

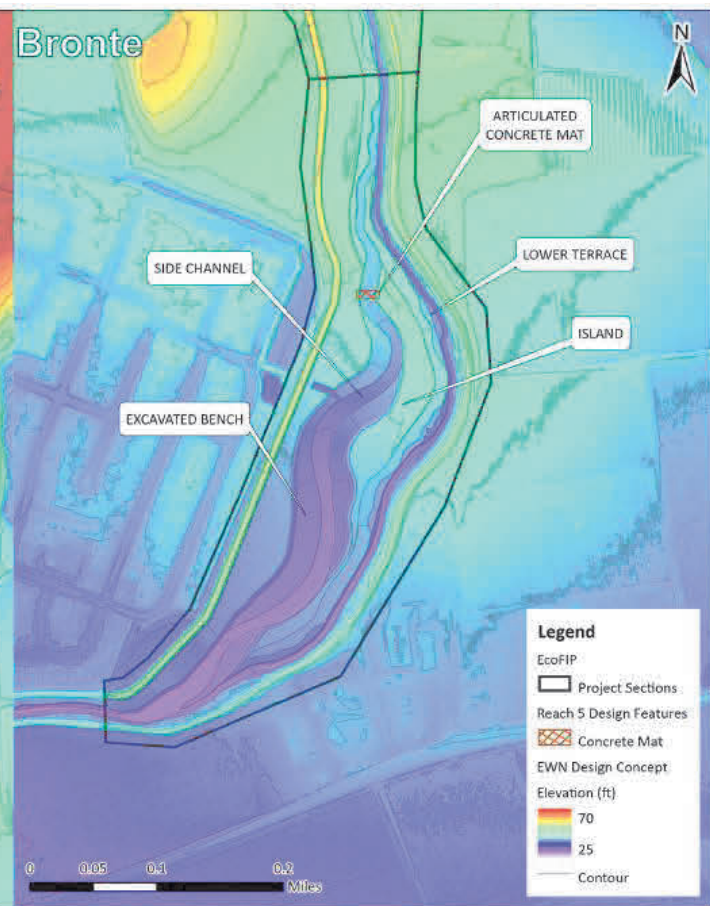
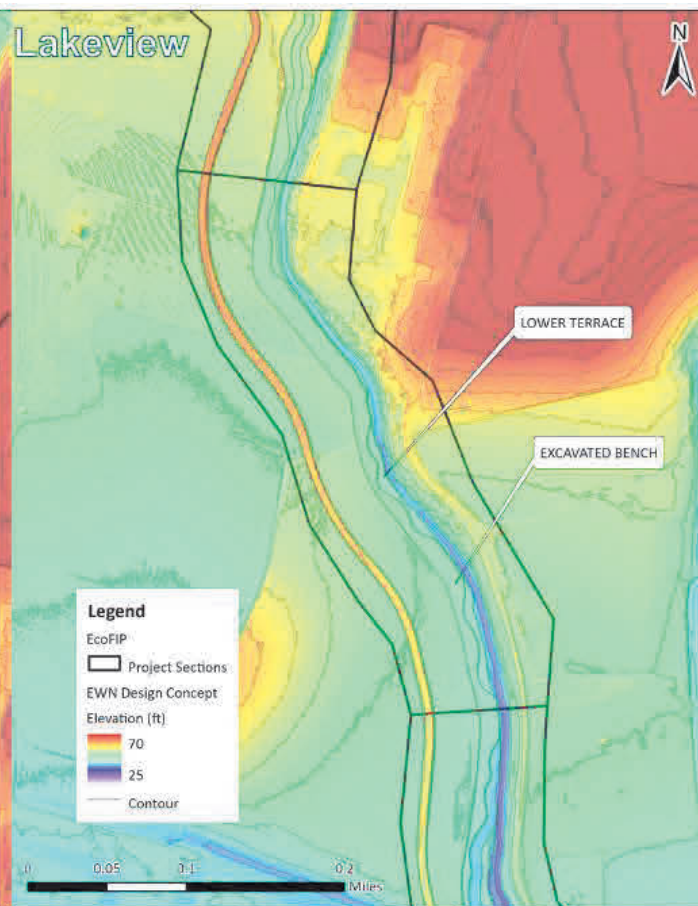
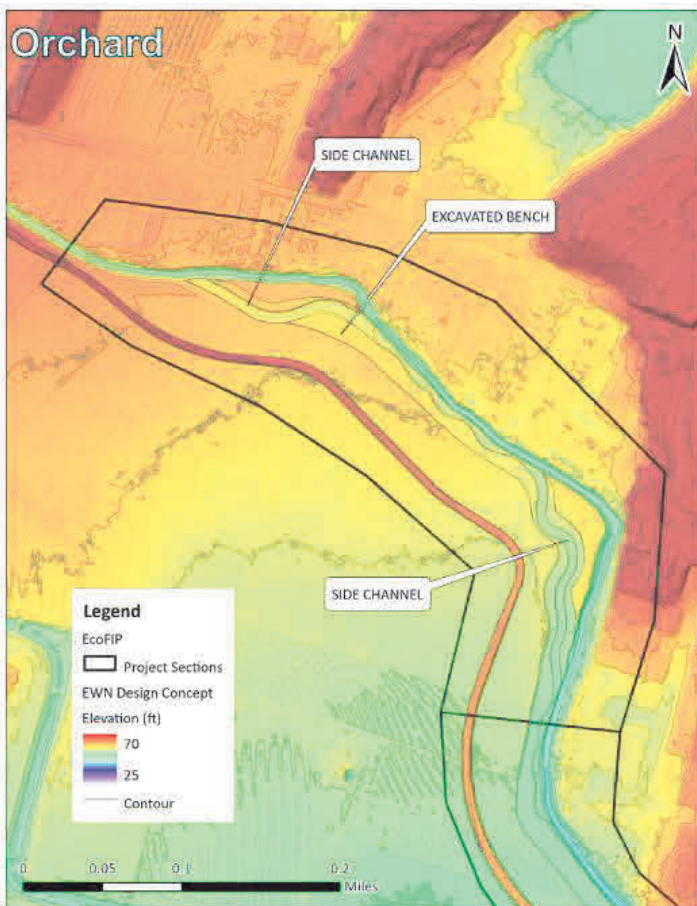
30% Design (left)

- ▶ Flood wall and levee setback

EWN Design (right)

- ▶ Flood wall and additional levee setback in Bronte Section
 - Good for sourcing levee borrow material
 - Provides backwater habitat
- ▶ Additional design features include lower terraces, excavated benches, island, and side channels





OPERATIONS AND MAINTENANCE CONSIDERATIONS

Two roughness conditions were considered

- ▶ Provides a range of potential channel conditions that could impact channel hydraulics and flood risk
- ▶ **Existing** roughness represents conditions immediately following project construction
- ▶ **Future** roughness represents a conservative estimate of total allowable riparian vegetation
- ▶ In the EWN design with future roughness, 37.9 acres of riparian vegetation were included compared to 11.5 acres for the 30% design

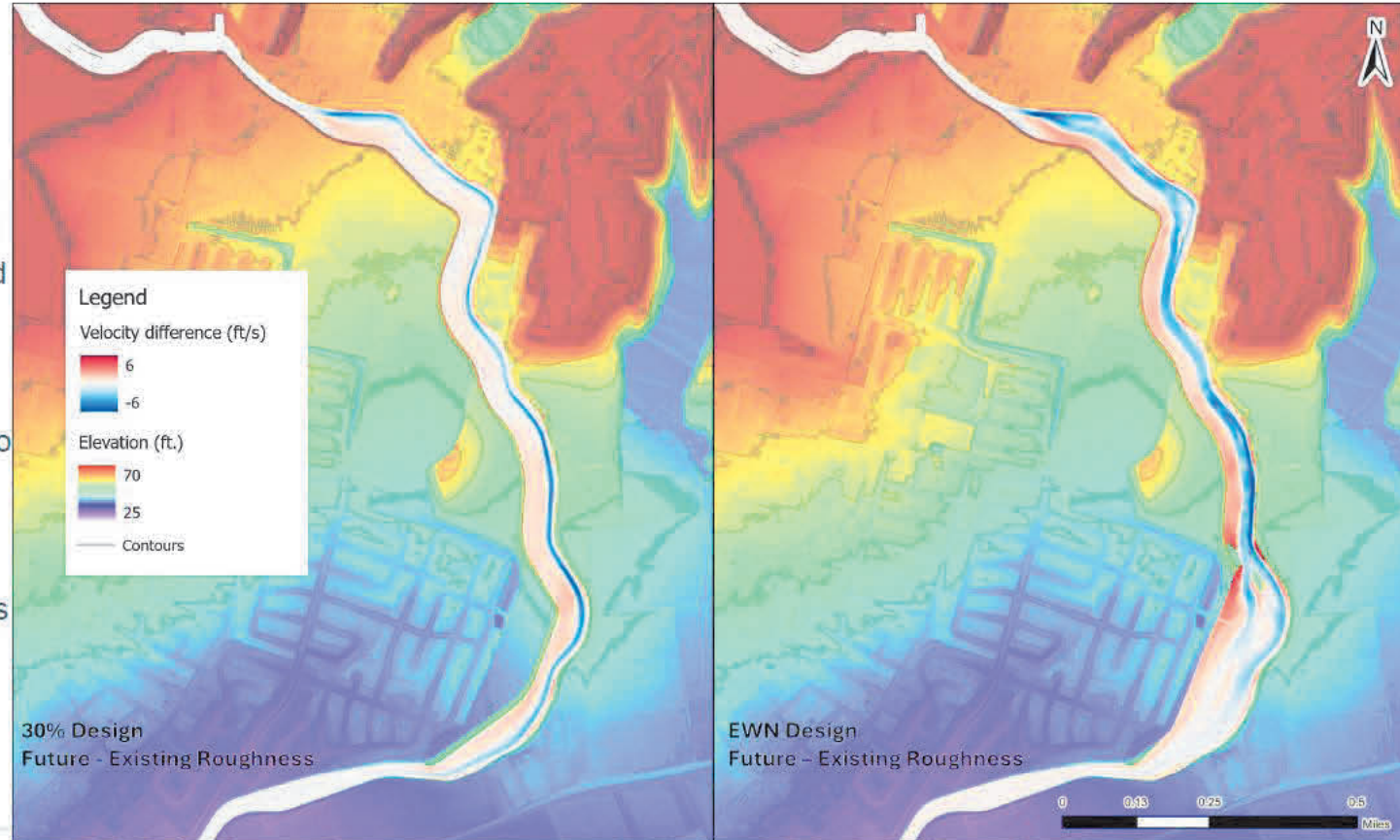
SMMP and O&M manual forthcoming



HYDRODYNAMIC MODEL RESULTS

100-yr flood comparison between existing and future roughness for both scenarios:

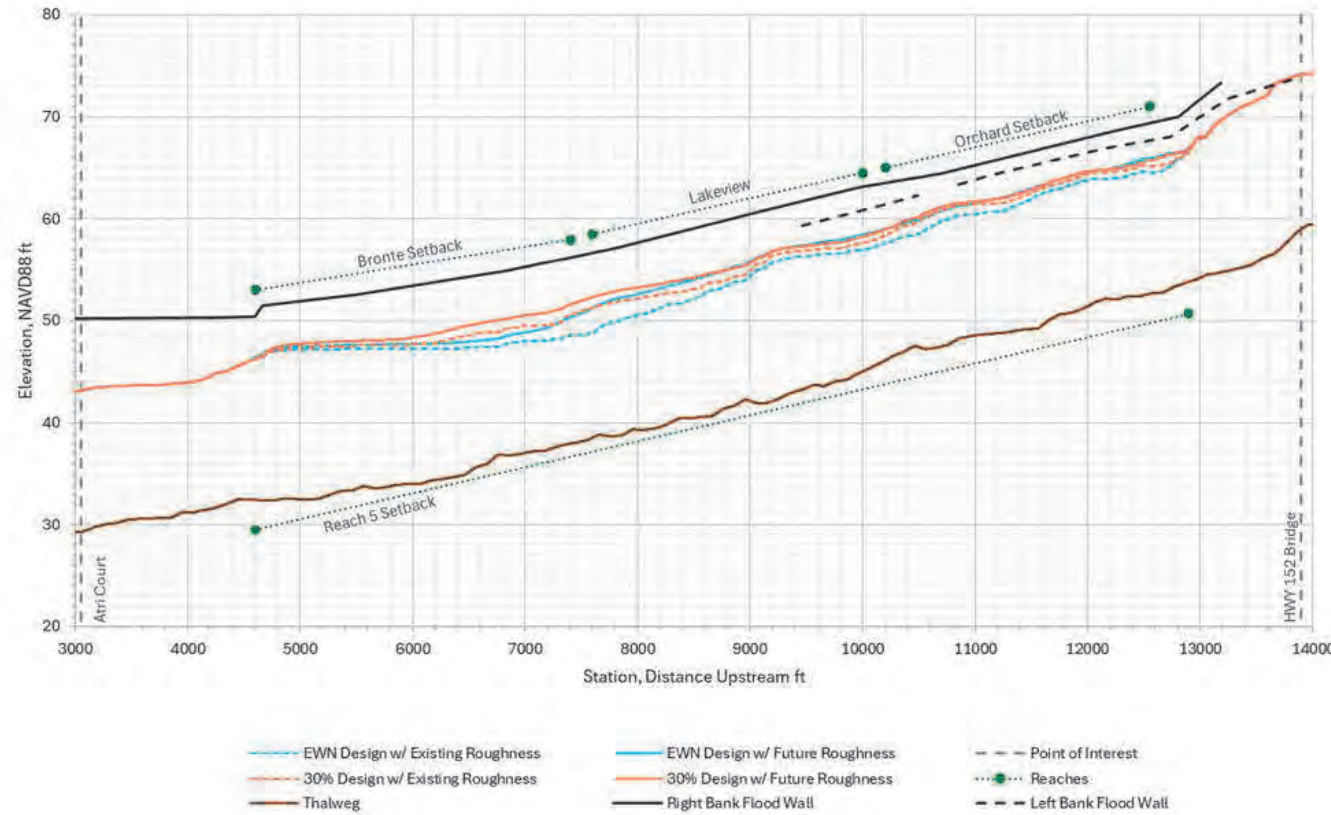
- ▶ **Future** roughness conditions led to slower main channel velocities and faster velocities in upland areas and along levee slopes compared to existing conditions
- ▶ Increased channel roughness in future conditions diverted water onto lower roughness areas.
- ▶ Added capacity and conveyance along benches in the EWN design generally resulted in lower velocities in the low flow channel.



HYDRODYNAMIC MODEL RESULTS

Hydrodynamic modeling results:

- ▶ The EWN design reduced WSE compared to the 30% design for existing roughness
 - EWN project design features increased the channel cross-sectional area with the proposed grading.
- ▶ Under future roughness, WSE reductions were similar in the Bronte and downstream Lakeview reaches, while the upstream Lakeview and Orchard reaches showed no change.



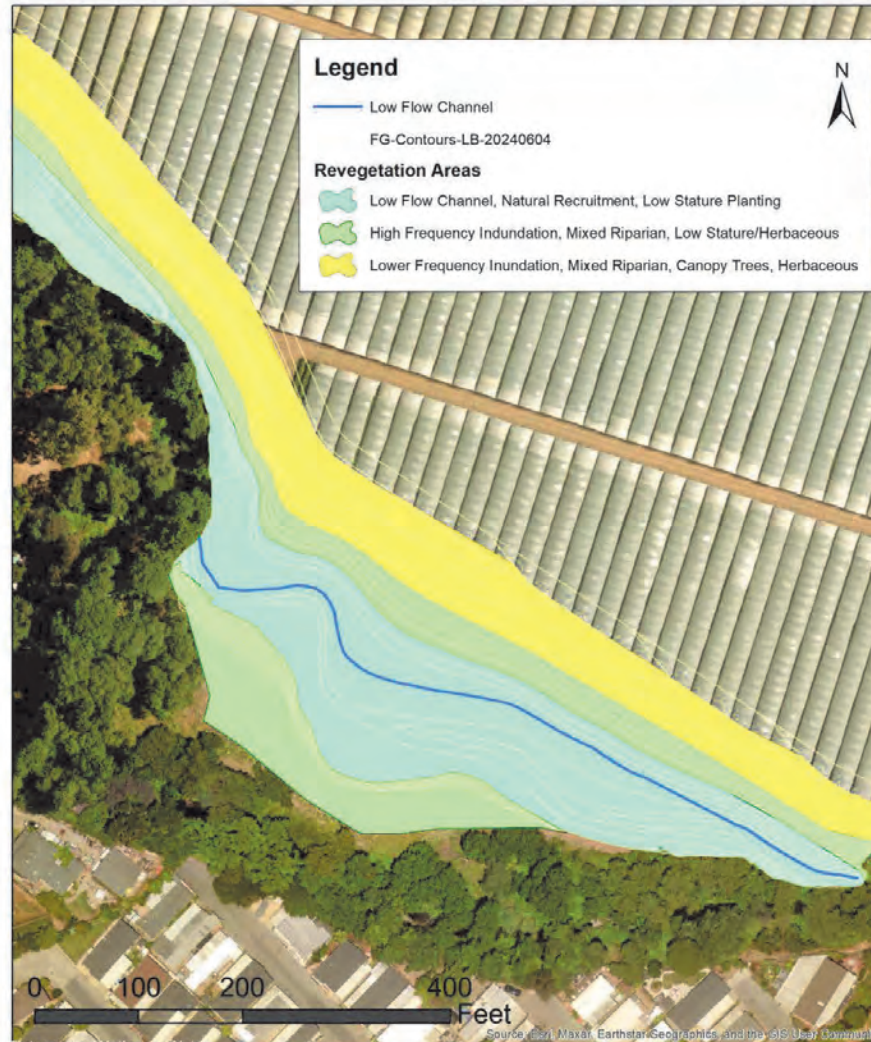
Credit: cbec

REVEGETATION

- Partnering with Wetlands Watch
- Job training program
- Nursery with native plants from watershed
- Seed collection for hydroseeding
- Pre- and post-project monitoring



Reach 06 Terrace 3 Planting Concept Plan DRAFT



PERMITTING PATHWAYS

- **CEQA Exemption**
 - With continuing coordination
- **Federal Permitting Process**
 - BiOP with USFWS
 - NLAA under ESA with NMFS
 - Programmatic Agreement SHPO
- **For each Reach**
 - 401 WQC – RWQCB Region 3
 - Section 106 NHPA
 - Consultation with all tribes

AB 876
Page 1

Date of Hearing: September 14, 2023

ASSEMBLY COMMITTEE ON NATURAL RESOURCES

Luz Rivas, Chair

AB 876 (Robert Rivas) – As Amended September 7, 2023

SUBJECT: Pajaro River Flood Risk Management Project: environmental laws: exemptions

SUMMARY: Exempts state and local approvals of the Pajaro River Project from specified waste discharge permit and lake and streambed alteration agreement (LSAA) requirements. Declares that the environmental assessment previously prepared for the project by the U.S. Army Corps of Engineers (Army Corps) satisfies the requirements of the California Environmental Quality Act (CEQA).

RESEARCH AND COLLABORATION

UCOP Climate Action Seed Project: Improving water system resilience to climate change with levee setback to create multiple benefits

Lead Researchers:

Andy Fischer, UC Santa Cruz – Hydrogeology, groundwater

Nicholas Pinter, UC Davis – Sediment transport, Geomorphology

John Olsen – CSU Monterey Bay, Nutrients

Mike Kiparsky – UC Berkeley, Policy, permitting

+ lots of great grad students!

End Users:

USACE, PRFMA, RCD

Technical Advisory Committee:

Resources Agencies, CBOs



 frontiers | Frontiers in Water

TYPE Original Research
PUBLISHED 02 April 2025
DOI 10.3389/frwa.2025.1566458

 Check for updates

OPEN ACCESS

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Siloed funding of multibenefit projects highlights the need for funding programs that integrate cobenefits

Marie Grimm^{1*}, Anna Serra-Llobet², Molly Bruce¹ and Michael Kiparsky¹

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NEXT STEPS

- Construction starting now!
- Reach 6 EWN floodplain designs saved 20% of borrow costs (win-win)
- Reach 5 floodplain designs at 60%
- **UCOP research continues:** empirical data quantifying groundwater recharge, nutrients and sediment transport.
- Planning of other reaches ongoing



Cottonwood stand on Reach 6. Moved terrace location to avoid impacts.

MOVING THE NEEDLE

- Turning **pilots** into **commonplace** actions
- Working **collaboratively with partners** is essential to nature-based adaptation to climate change
- Focus on supporting and centering communities
- Opportunities for **research**, partnering with USGS, universities. Using **science** to move forward.
- **Place-specific** work but share it widely!

<https://ewn.erd.c.dren.mil/ewn-for-the-dod/>

Engineering With Nature

Engineering With Nature For Mission-Ready Infrastructure

[REGISTER NOW >](#) Starting January 2025 | Monthly Virtual Course for the Department of Navy

STORIES IN MARYLAND AND D.C.

Sediment Strategies

Putting Mud to Work

August 22, 2025



<https://www.nature.org/en-us/about-us/where-we-work/united-states/maryland-dc/stories-in-maryland-dc/sediment-strategies/>

US ARMY
U.S. Army Corps of Engineers
ERDC

Engineering Practice Guide For Floodplain Benching

A report informing engineering activities related to site investigation and design of floodplain benches for use by engineers and ecologists to inform the design of floodplain benches in a manner consistent with and to augment other planning, design, and engineering guidance.

[VIEW GUIDE >](#)

[EXPLORE CASE STUDIES \(COMING SOON\) >](#)

[RELATED LITERATURE \(COMING SOON\) >](#)

<https://ewn.erd.c.dren.mil/engineering-practice-guides/>



THANK YOU

Contact:

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